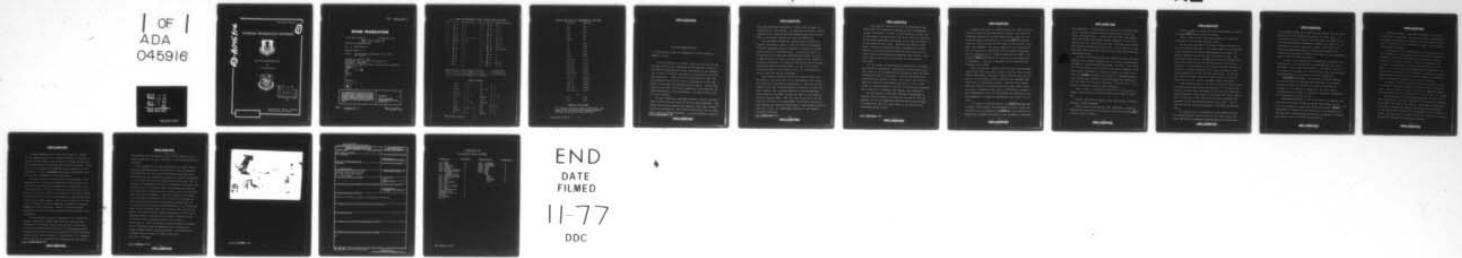


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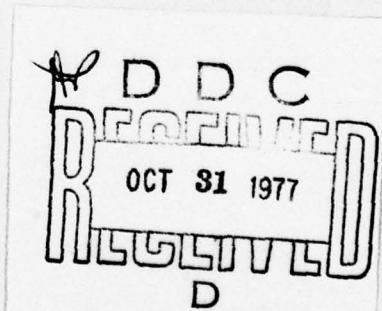
## FOREIGN TECHNOLOGY DIVISION



THE MAIN TRANSFORMATIONS

by

G. Voytsekhovich



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| Block | Italic     | Transliteration | Block | Italic     | Transliteration |
|-------|------------|-----------------|-------|------------|-----------------|
| А а   | <b>А а</b> | A, a            | Р р   | <b>Р р</b> | R, r            |
| Б б   | <b>Б б</b> | B, b            | С с   | <b>С с</b> | S, s            |
| В в   | <b>В в</b> | V, v            | Т т   | <b>Т т</b> | T, t            |
| Г г   | <b>Г г</b> | G, g            | У у   | <b>У у</b> | U, u            |
| Д д   | <b>Д д</b> | D, d            | Ф ф   | <b>Ф ф</b> | F, f            |
| Е е   | <b>Е е</b> | Ye, ye; E, e*   | Х х   | <b>Х х</b> | Kh, kh          |
| Ж ж   | <b>Ж ж</b> | Zh, zh          | Ц ц   | <b>Ц ц</b> | Ts, ts          |
| З з   | <b>З з</b> | Z, z            | Ч ч   | <b>Ч ч</b> | Ch, ch          |
| И и   | <b>И и</b> | I, i            | Ш ш   | <b>Ш ш</b> | Sh, sh          |
| Й й   | <b>Й й</b> | Y, y            | Щ щ   | <b>Щ щ</b> | Shch, shch      |
| К к   | <b>К к</b> | K, k            | Ђ ъ   | <b>Ђ ъ</b> | "               |
| Л л   | <b>Л л</b> | L, l            | Ӧ Ӧ   | <b>Ӧ Ӧ</b> | Y, y            |
| М м   | <b>М м</b> | M, m            | Ӧ Ӧ   | <b>Ӧ Ӧ</b> | '               |
| Н н   | <b>Н н</b> | N, n            | Ӧ Ӧ   | <b>Ӧ Ӧ</b> | E, e            |
| Ӧ Ӧ   | <b>Ӧ Ӧ</b> | O, o            | Ӧ Ӧ   | <b>Ӧ Ӧ</b> | Yu, yu          |
| Ӧ Ӧ   | <b>Ӧ Ӧ</b> | P, p            | Ӧ Ӧ   | <b>Ӧ Ӧ</b> | Ya, ya          |

\*ye initially, after vowels, and after ж; e elsewhere.  
 When written as ё in Russian, transliterate as ye or ё.  
 The use of diacritical marks is preferred, but such marks  
 may be omitted when expediency dictates.

GREEK ALPHABET

|         |   |   |   |         |   |   |
|---------|---|---|---|---------|---|---|
| Alpha   | A | α | • | Nu      | N | ν |
| Beta    | B | β |   | Xi      | Ξ | ξ |
| Gamma   | Г | γ |   | Omicron | Ο | ο |
| Delta   | Δ | δ |   | Pi      | Π | π |
| Epsilon | Ε | ε | ε | Rho     | Ρ | ρ |
| Zeta    | Z | ζ |   | Sigma   | Σ | σ |
| Eta     | Η | η |   | Tau     | Τ | τ |
| Theta   | Θ | θ | θ | Upsilon | Τ | υ |
| Iota    | I | ι |   | Phi     | Φ | φ |
| Kappa   | K | κ | κ | Chi     | Χ | χ |
| Lambda  | Λ | λ |   | Psi     | Ψ | ψ |
| Mu      | M | μ |   | Omega   | Ω | ω |

## RUSSIAN AND ENGLISH TRIGONOMETRIC FUNCTIONS

| Russian   | English      |
|-----------|--------------|
| sin       | sin          |
| cos       | cos          |
| tg        | tan          |
| ctg       | cot          |
| sec       | sec          |
| cosec     | csc          |
| sh        | sinh         |
| ch        | cosh         |
| th        | tanh         |
| cth       | coth         |
| sch       | sech         |
| csch      | csch         |
| arc sin   | $\sin^{-1}$  |
| arc cos   | $\cos^{-1}$  |
| arc tg    | $\tan^{-1}$  |
| arc ctg   | $\cot^{-1}$  |
| arc sec   | $\sec^{-1}$  |
| arc cosec | $\csc^{-1}$  |
| arc sh    | $\sinh^{-1}$ |
| arc ch    | $\cosh^{-1}$ |
| arc th    | $\tanh^{-1}$ |
| arc cth   | $\coth^{-1}$ |
| arc sch   | $\sech^{-1}$ |
| arc csch  | $\csch^{-1}$ |
| rot       | curl         |
| lg        | log          |

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FIRST TYPING LINE

THE MAIN TRANSFORMATIONS

G. Voytsekhovich, Chief of Administration of the Aviation-Engineer Service

In the directives of the XXII Congress of the CPSU for the five-year plan for the development of the national economy of the USSR for 1966-1970 the further improvement of the organization of labor, production and control is foreseen as one of the main directions. A high degree of effectiveness of labor can be guaranteed only with the correct determination of ties and rules in industrial and administrative activity. This problem should be resolved collectively regardless of the magnitude and branch affiliation of the enterprises. All this is also valid for civil aviation.

But each enterprise, including aviation, differs from each other in the volume and nature of the work being performed. And within an enterprise between its component links there is separation and cooperation. Even related enterprises, just as their links, are not always equivalent. In civil aviation in partic-

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ular, the safety and regularity of flights and the degree of utilization of fixed capital - the aircraft motor park - depend greatly on the correctly selected organizational structure for them, on how much it answers the needs of production.

The thoroughly thought-out organizational structure of aviation enterprises, based on objective data and thoroughly developed standards, makes it possible to construct an industrial process on a scientific base. The structure should be typical and at the same time sufficiently flexible, in order, on the one hand, to satisfy the requirements of the different Aeroflot enterprises - of large and small transport and special application; and on the other hand - to take into account a constant increase in the volume of work, the introduction of new, all the more complex technology.

Here, briefly speaking, are those principles which were the basis for the great work on the improvement of the technical servicing of airplanes and helicopters. This work was performed by the State Scientific-Research Institute of Civil Aviation together with the Administration of Aviation-Engineer Service and the Department of Labor and Wages of the Ministry of Civil Aviation (MGA). This work was the result of the putting into operation of a large number of aircraft with gas-turbine engines, the intensive development of agricultural aviation, and, as a result, the considerable increase in the volume of technical servicing.

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Since 1960 the volume of work at line maintenance and repair shops has increased in Alma-Ata by 155, in Ashkhabad - by 160, in Leningrad - by 167, in Rostov-na-Donu - by 206, and in Krasnoyarsk - by 260 percent; and on the whole for self-supporting LERM [maintenance and repair shops (civil air lines)] - by approximately three times. Meanwhile the number of line shops, converted to self-supporting, increased by 2.5 times. However, in all the aviation enterprises where there were no repair shops, nonself-supporting LERM have been created. However, even in them there were elements of intra-economic accounting.

For the purpose of improving the organization of airplane and helicopter maintenance, especially in special-purpose aviation, and also for strengthening its industrial base, the engineering and technical personnel at aviation enterprises were centralized into unified services. As a result the culture of labor and quality of maintenance, and control over it, were raised, it became possible to utilize the cadres more rationally and to make use of equipment considerably more effectively.

The realization of efficient planning, strengthening of control, and the creation of groups and sections for the preparation of work in combination with material motivation made it possible for the line repair shops to cope with the ever increasing volume of work.

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Together with this, in connection with the vigorous development of transport and agricultural aviation, new industrial components appeared in the line repair shops: shops for servicing airplanes and helicopters of special <sup>purpose</sup> ~~use~~ aviation and local air lines, sections for the repair of agricultural equipment, ramp brigades. The repair shops were also supplemented with new functions, transferred from the flight detachments, but not reflected in the "Standard regulation for LERM" - for example, ~~claims~~, <sup>periodic servicing</sup> accounting for carrying out of modifications on equipment. This led to disparity in the organizational structure of the LERM.

Thus with the same volume of work in some self-supporting repair shops there were chief mechanic sections, and in others (Minsk, Novosibirsk, Krasnodar, Frunze, Donetsk) they were not set up. At the Odessa, Saratov, Kishinev and Volgograd LERM there were no engineering sections. Analogous shortcomings also were inherent to nonself-supporting repair shops, where, as a rule, coordination and control of maintenance processes were implemented poorly, and the analysis and planning of work and management of technical documentation were found on a low level.

In a number of LERM the absence of ~~production~~-dispatching sections, chief mechanic and engineering sections, groups and sections for the preparation of <sup>work</sup> ~~production~~, and production engineers had a negative influence on the servicing of airplanes

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and helicopters. In particular, in the work of the shift engineers, who had to digress from the fulfillment of their own direct responsibilities. Moreover the very name "line maintenance and repair shop" became clearly outdated. In the sense that not all the repair shops are line, since they also service agricultural airplanes and helicopters. And already for a long time many repair shops have been converted into major aviation-engineering bases.

And due to everything which was pointed out above the need arose not for a simple renaming, but for a basic reorganization of LERM into aviation-engineering bases. By order of the minister of civil aviation and approved by the State Committee of the USSR Council of Ministers on labor and wages, the model structures and ~~raised~~ enlarged standards of strength of technical-engineering personnel and employees at aviation-engineering bases were put into effect for Aeroflot enterprises of classes 1-4. Five groups of standard structures were stipulated:

first - bases of transport enterprises 1st class with an annual volume of work in adjusted units of more than 60 thousand;

second - bases of 1st and 2nd class enterprises, primarily transport (30-60 thousand);

third - bases of 2nd and 3rd class enterprises, operating airplanes and helicopters of transport aviation and special <sup>purpose</sup> ~~use~~ aviation (10-15 thousand);

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fourth - bases of 3rd and 4th class enterprises, primarily of special-<sup>purpose</sup> ~~use~~ aviation (10-15 thousand);

fifth - bases of 4th class enterprises with a volume of work from 5 to 10 thousand adjusted units.

We will turn attention to the basic changes introduced by the new standard structures. At aviation bases for 1st and 2nd class enterprises the engineering-maintenance personnel for special equipment on aircraft were dispersed by shops. This has already been done at Vnukovo<sup>o</sup>, Sheremet'yeva, Kuybishev and other major airports and has justified itself completely in practice. For supervision of the special equipment service the positions of senior engineers in the shops and deputy to the chief engineer of the base are being introduced. At 3rd and 4th class enterprises, where the volume of work is less, the shops (sections) for special equipment remain independent.

At all aviation bases of the first, second and third groups technical-design departments are organized. It is namely they who are entrusted with fulfillment of the functions which have been transferred in due course to the LERM by the flight detachments. This will be the concern of the senior engineers and engineers of the technological-design bureau (TKB) - who are top-level on the corresponding types of airplanes and helicopters.

The organization of maintenance at incorporated airports for special-purpose aviation and local air lines, which have their own fleet of airplanes and helicopters, is constructed

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on the same principle as in main base enterprises with the preferred use of the standard structure of the fifth group. At incorporated airports which do not have their own fleet of vehicles only operational engineering brigades are created for the servicing of aircraft which pass through. The heads of the aviation-engineering service of incorporated airports are governed in operational problems by the heads of the engineering bases of the main base enterprises.

By order of the minister all airplanes and helicopters are transferred to the jurisdiction of aviation-engineering bases, although as before they will be found on the balance sheets of the aviation enterprises. In connection with this, the following responsibilities are entrusted to the base departments:

*WORK*  
PRODUCTION-DISPATCHING - operational and future planning of the utilization of airplanes and helicopters in accordance with the schedule and needs for air traffic; planning the pulling out of equipment for maintenance and major repair; organization and planning of occasional inspection of equipment, its modification and check of use;

TECHNOLOGICAL-DESIGN - Check of the status of airplanes and helicopters and their special equipment; organization of the issue of equipment to repair and receipt from repair; *periodic service; claims;* development of measures for the prevention of malfunctions and failures due to design-production defects; management of durability charts; check of on-board documentation;

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TECHNICAL CONTROL - check and accounting of occasional inspections of equipment, structural and other modifications; accounting and analysis of failures and malfunctions; development of measures for the prevention of cases of poor-quality servicing of equipment.

Two years ago the responsibility of the direct users for the carrying out of operational forms of periodic services was increased. Therefore at present the OTK [technical control section] does not have control of their fulfillment on all aircraft. The engineers of this section perform only spot checks. As a result the possibility has been created, at the expense of a reduction of OTK personnel, to augment the technological design bureaus with the leading engineers on different types of airplanes, helicopters and special equipment.

The heads of aviation-engineering bases and their deputies are entrusted with the drawing up of the necessary documentation. They are given the right to extend the effective periods of certification of the suitability of civil aircraft for flights.

The conversion of the aviation-engineering service of Aeroflot enterprises to the new structure is being realized gradually according to the plan of the ministry. The heads of administrations have to develop and approve the structures and manpower of subordinate bases taking into consideration the local conditions. Here they have to follow strictly the standard structures, and also the expanded norms which are maximum.

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At each administration a flow sheet should be compiled for the implementation of the standard structures with an indication of the sequence and periods for staffing the bases of the enterprises with engineering and technical personnel. First of all it is necessary to establish sections (groups) for the preparation of work, ~~production~~<sup>work</sup>-dispatching departments, technical control departments, and supply groups.

This work should be combined with the fulfillment of the requirements for the aviation-engineering service which were laid out in the organizational-methodical instructions of the ministry for 1967. In the current year in particular, at air bases the preventive technical maintenance of the Il-18, Tu-104, Tu-124 and An-24 aircraft is being organized based on the technology of the repair plants. This work is planned for the airports at Vnukovo, Alma-Ata, Leningrad, Tolmachevo, Sverdlovsk, Khabarovsk, Kiev, Kirovograd (School for advanced flight training), and the most serious attention must be given to its fulfillment.

It is necessary to take all measures for the timely operational readiness of hangers which are under construction, buildings for technical services, and the docks, which have already been prepared and delivered, for the Tu-104 and An-24 airplanes and the Mi-1 and Mi-4 helicopters. <sup>[It is necessary to]</sup> Provide the industrial sections with the means for mechanization, the equipment and devices for the expeditious and high-quality servicing of

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*[It is necessary to]*  
contemporary aviation equipment. <sup>^</sup> See to the creation of good working conditions for the collectives at the aviation-engineering bases.

The reorganization of line maintenance and repair shops at aviation-engineering bases, the delivery to them of airplanes and helicopters as well as other innovations which have been introduced into the engineering services of Aeroflot enterprises - all of these are important transformations. They will make it possible to significantly improve the servicing of airplanes and helicopters for air transport and in special-purpose aviation. Idle time will be reduced, and the working order of the aircraft motor park will be enhanced. Under the conditions of transfer of our aviation enterprises to the new system of planning and economic motivation this will open greater possibilities for the successful fulfillment and overfulfillment of the industrial quotas of the five-year plan. Still another major step will be made on the path to further technical progress of Soviet civil aviation, which is exerting all the greater influence on the development of the industrial power of the country.

Photo caption: (left) Servicing a Tu-104 aircraft in a hanger at the Tolmachevo aviation-engineering base (Novosibirsk). (right) Vnukovo aviation-engineering base. By morning these airplanes should be ready for making their runs.

Photo by I. Seregina

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